

REMARKS

Claims 2, 4, 5, 7, 9, 11, 12, 14 and 18 currently appear in this application. The Office Action of February 20, 2004, has been carefully studied. These claims define novel and unobvious subject matter under Sections 102 and 103 of 35 U.S.C., and therefore should be allowed. Applicants respectfully request favorable reconsideration, entry of the present amendment, and formal allowance of the claims.

Claims 1-5, 7-12 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiya et al. in view of Chen, Sr. et al. Kamiya et al. are said to teach a sliding bearing and method of making the sliding bearing wherein a resin surface layer is provided on a roughened surface of an aluminum bearing alloy layer on a metal backing, and then heated or fired to harden the surface layers. An intermediate bonding layer may be first applied to the roughened surface, this resin surface layer comprising a polyimide binder and a solid lubricant. A friction adjusting agent may be included.

The Examiner concedes that Kamiya et al. do not teach the resin is a polybenzimidazole. Chen, Sr. et al. are said to teach a miscible blend of polybenzimidazoles and polyamideimides which can be compounded with graphite or molybdenum disulfide to produce surfaces for bearings. The Examiners' contention is that one skilled in the art would

have been motivated to use polybenzimidazole in place of, or bonded with, polyimide resins.

This rejection is respectfully traversed. Claims 1, 3, 8, 10 and 15-17 have been cancelled, and claim 2 has been amended. Claim 2 provides a sliding bearing comprising a bearing alloy having a sliding surface, a bonding layer comprising a thermosetting resin further comprising one or more of polyamide-imide, epoxy resin and phenol resin which bonding layer is provided on the sliding surface of the bearing alloy layer, and a resin surface layer provided on the bonding layer. The resin surface layer contains 20-95% by volume of polybenzimidazole as a base resin and 5-80% by volume of a solid lubricant.

Claim 2 recites that the bonding layer comprises a thermosetting resin further comprising one or more of polyamide-imide, epoxy resin and phenol resin, which bonding layer is provided on the sliding surface of the bearing alloy layer. It is respectfully submitted that this bonding layer is different from that of Kamiya et al. Kamiya et al. disclose that "when the sliding bearing materials have different colors, it is possible to investigate and specify the place, depth, and number of the local-contact and the cause thereof and to feed back the obtained information to the design of the bearing and the shaft." Furthermore, in order

to improve the bonding between the coating layer and the bearing alloy layer, Kamiya et al. disclose that the bearing alloy surface is required to be roughened for improvement in the bonding performance, and that a chemical conversion treatment is required for further improvement in the bonding performance (column 3, lines 16-29). Thus, in Kamiya et al., two coating layers have different colors in order that the place, depth and number of the local-contact may be investigated. However, Kamiya et al. fail to disclose that a bonding force of the lower layer, closer to the bearing alloy, is increased. Moreover, Kamiya et al. disclose other means for improving the bonding force, that is, roughening and chemical conversion treatment. Accordingly, Kamiya et al. neither disclose nor suggest anything about providing a bonding layer comprising a thermosetting resin so that a bonding force is improved between the bearing alloy layer and the resin surface layer.

Chen, Sr. adds nothing Kamiya et al. to render the present invention obvious. The blends of polymers in Chen, Sr. et al. require the presence of a polyamide-imide having fluorine-containing linking groups. According to Chen, Sr. et al., it is the fluorine-containing linking groups that make it possible to provide blends of polybenzimidazoles and polyamide-imides. There is nothing in Chen, Sr. et al. that

would lead one skilled in the art to consider using polybenzimidazole in place of, or blended with, a polyimide.

Claims 1-5, 7-12 and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamiya et al. in view of Chen, Sr. et al. and further in view of Andres et al. or White or Korshak et al. White is said to suggest that polybenzimidazole is a suitable material comparable to polyimides and polyamide imides when the bearing is subjected to high temperatures. Andres et al. are said to teach a self-lubricating composition comprising polybenzimidazole and internal lubricants such as graphite and boron nitride. Korshak et al. are said to teach that polybenzimidazole in conjunction with fillers such as MoS<sub>2</sub> provides excellent antifriction properties.

This rejection is respectfully traversed. White discloses at column 5, lines 28-35, that high temperature resins include epoxides, epoxy phenolic amide imides, polyimides, polybenzimidazole, polycarboranesiloxanes, and the like. However, as shown in Table 1 of page 3 of the present application, polybenzimidazole has higher heat resistance and material strength than the conventionally used thermosetting resins such as polyamide-imide, polyimide, and epoxy resins. Therefore, one skilled in the art reading White would not be motivated to use a resin other than polybenzimidazole. Andres

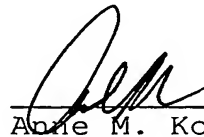
et al. also add nothing to Kamiya et al. because Andres et al. merely disclose that polymeric composition containing internal lubricants is suitable for low friction applications. There is nothing in Andres et al. that would suggest using the polybenzimidazoles as a resin surface layer of a bearing alloy. Despite the teaching of Korshak et al. that polybenzimidazole can be blended with molybdenum disulfide to produce an antifriction material, there is no indication that this composite is suitable for use on sliding bearings, or that such a mixture could be substituted for the resins disclosed in Kamiya et al.

In view of the above, it is respectfully submitted that the claims are now in condition for allowance, and favorable action thereon is earnestly solicited.

Respectfully submitted,

BROWDY AND NEIMARK, P.L.L.C.  
Attorneys for Applicant

By



Anne M. Kornbau  
Registration No. 25,884

AMK:msp  
Telephone No.: (202) 628-5197  
Facsimile No.: (202) 737-3528  
G:\BN\S\sato\tanaka111\PTO\12may04.amd.doc